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## SOME OF THE GEOGRAPHICAL FEATURES OF SOUTHEASTERN ALASKA.

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In the summer of 1886, a party consisting of Lieut. Schwatka and myself was sent out by the *New York Times* to explore the Mt. St. Elias Alps. On our way thither we passed through the wonderful archipelago region of Northwestern America, and although much has been written concerning the beauty of the scenery, the habits of the natives, etc., a short description of some of the main geographical features of this curious portion of our continent will form a fitting prelude to the discussion of what we found that was new and interesting. I shall not attempt a description of the country with reference to its resources, capabilities, etc., for that has already been done to some extent by Prof. Dall, by the Krause brothers, by Petroff, and by Elliott; nor shall I describe the early attempts at Alaskan settlement. Those who wish a most dramatic account of the struggles of the old Russian pirates for a foothold in this new territory, will find it in the volume on Alaska in Bancroft's "History of the Pacific Coast," which book, indeed, reads like a novel, for it is the history of an unknown land. But I shall try to give in as simple a manner as possible some of the physical characters of this most interesting region—which would be visited oftener were it better known.

This western archipelago district really begins at the Juan de Fuca Straits and extends to Cross Sound at the north, almost under the shadow of Mt. Fairweather, a distance of about 1,000 miles. At either end of this region there is a remarkable body of water which deserves mention. It is no wonder that the old navigators who first visited it, admired Puget Sound. Its varied features, the combination of beautiful bays and wooded shores, with Mt. Tacoma virtually at the head of the sound, and the fine group of Olympian Mountains between it and the Pacific, all make the scenery a continual feast for the critical observer. Passing across the straits, the harbor of Victoria is reached, and here the trip on the inland passage begins, in the course of which we traverse some  $12^{\circ}$  of latitude. Strange as it may seem, the climatic differences and conditions are not so varied as might be expected, for at this point the effect of the warm ocean current of the Northern Pacific is strongly felt, and it serves to moderate the wintry character of the northern portion, and again, tempers the summer of the southern part.

These passages were very generally surveyed and grouped by that prince of the older navigators, Vancouver, about one hundred years ago, and it is to his industry and zeal that we owe much of our knowledge of this part of our country. Nearly all of them can be traversed by the largest ships, and the numberless smaller waterways, which are now only known and utilized by the Indians, will some day become the favorite resort of the canoe clubs of the Pacific coast. Many of these fjords pass inland, but the larger and more important run parallel to the coast. The most remarkable, perhaps, is

Chatham Strait, which passes over 3° of latitude, is from five to six miles broad, and has a depth of from 500 to 600 feet. To this might be added the Lynn Canal, Glacier Bay, Takoo Inlet, Boca de Quadra Straits, and, above all, the Portland Canal, through which passes the boundary between British America and Alaska, and many others, all of which have their own characteristic charms. They have been well compared to the streets and avenues of a great city, and as one travels along for days on these peaceful waters without feeling the motion of the great Pacific, which is often plainly in sight, in imagination the bustle and turmoil of the metropolis is hushed and the rest of the world almost forgotten. The thing that most reminds the traveller that he is really on an arm of the ocean, is the remarkable rise and fall of the tides, which average about twenty feet, and the strong eddies and currents which are established on either side of slack water are the only sources of danger to ships. Peril Straits, the favorite passage between Glacier Bay and Sitka, is a good example of this, as the sharp turns of the channel are very dangerous between the ebb and flood of the tide.

In searching for the causes which produced this region, one is struck with its similarity to the western coast of Norway. Here we find the same climatic conditions which are so favorable for the production of great ice masses, viz.: constant winds laden with moisture, which condenses at a slight elevation in this latitude in the shape of snow ; and as the heat of summer does not succeed in melting these bodies, vast accumulations take place. To-day we find in the glaciers which gleam on the mountain sides of these channels only the relics of

their former greatness. The history of the great Muir Glacier at the head of the Glacier Bay is but the silent witness of the fact that these ice masses are rapidly receding to their mountain fastnesses, for it has retreated many miles towards its sources since it was first discovered. The traces of ice action are difficult to follow on account of the veil which has been thrown over them by the thick forests, deep moss-beds, and the serious destruction of the characteristic tool-marks of the ice through the disintegration of the rocks, brought about by the severe changes in temperature; but these traces can be found. If nothing else could be said, the shape and evenness of the beds of these channels would be convincing proofs of glacial action, for they cannot be the result of marine or fluviatile erosion. There are also a sufficient number of glaciers along these channels, many of them still reaching down to the water's edge, which serve to indicate their former extent. These glaciers are all the more impressive now because they are found in the midst of the most beautiful forests, and the temperate zone seems to be in this way placed side by side with the ice fields of the arctic. As we pass around the grand wooded headlands, we cannot resist a feeling of awe catching our first glimpse of these white waves of an icy sea through the bright foliage, and when they are lighted up by the soft glows of the evening sun, the beautiful panoramas demand and receive the most unstinted praise.

Every one who visits Alaska is surprised at the luxuriance of the vegetation, a feature which is undoubtedly due to those same air currents which, under different climatic conditions, covered this lovely spot with ice. We have every step in the process of the change exempli-

fied when we contrast the bare and almost woodless slopes of Glacier Bay with the growth on the sides of the channels where the ice has been absent for a longer period of time.

With such changes and attractions spread out before the tourist at each turn in his trackless path, we cannot wonder at the glowing descriptions we read of the scenery, and the keen enjoyment that is felt by all who visit this region; are they not the grateful expressions of praise for a climate and surroundings which almost make a human being forget his cares and give himself up to their refreshing influences? One beautiful vista after another is opened up before him, and instead of being exhausted by the trip when Sitka is reached, the traveller is only better prepared to enjoy the return trip. This Bay of Sitka is a wonderful place, and some of its points of interest amply repaid investigation.

On the southern shore of Kruzoff Island, which forms one side of the quiet harbor of Sitka, the star-like peak of a justly famous mountain rears its head towards the clouds. It is a beacon which is visible a great distance at sea, and in the past no doubt it was the guiding-star of the adventurers who chose this part of Alaska as the scene of their activity. Mt. Edgecombe is remarkable for its symmetry of shape and its graceful lines of beauty; and these features, combined with a snow-cap of wonderful proportion and outlines, makes it an imposing bit of natural scenery, possessing a species of fascination of which one never tires.

From a distance it seems to be the most prominent peak of a small group of mountains; but a careful study reveals the fact that *the* great volcano of this region has

not yet been described, and the peak which has attracted most attention is merely a parasitic cone on the side of a grand old crater which has not been active for hundreds of years, while the other peaks of the group seem to be remnants of a still greater volcano whose history would carry us back to the most remote past. The mountain group reminds one strongly of Monte Somma and its successor Vesuvius, except that our northern mountain is wreathed with a glistening coronet of purest snow throughout the greater part of the year, and is considerably higher than its older crater, which is not the case with Vesuvius. This group of elevations appears to rise from a sort of plateau, which is nothing more or less than the outer surface of the overflows of the greater volcano referred to above. The peak now known as Mt. Edgecombe is situated on the southwestern portion of this main mass and reaches above it about 2,000 feet, making the total elevation of the mountain nearly 4,000 feet.

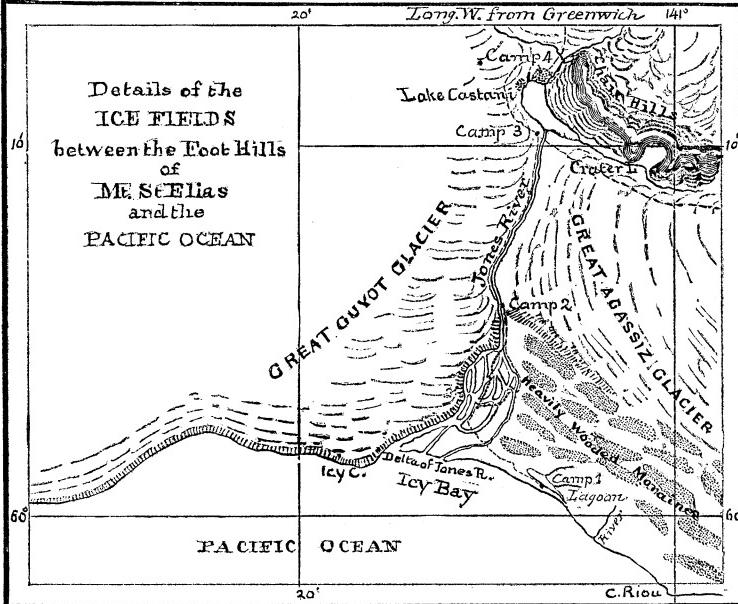
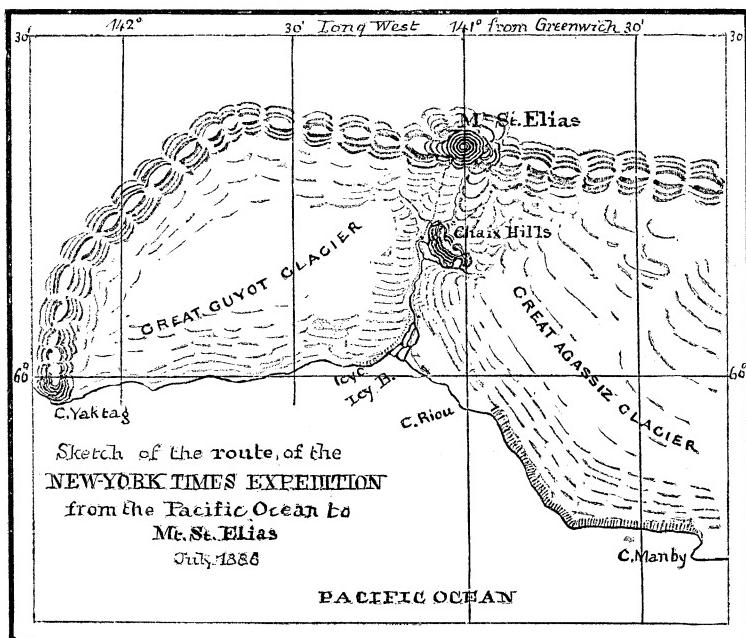
The character of each of these mountains (for they should be considered separately) is a very instructive study in physical geology, as we have here representatives of the two main forms of volcanic structure. The older and larger crater evidently was the point from which all the great lava streams flowed to form the whole lower extremity of the island. These lava streams can be distinctly seen to radiate from the old volcano in all directions, and can be traced from four to eight miles to the seashore on three sides, where the heavy black basaltic columns form the numerous capes which extend out into the ocean; in many instances strongly resembling the formation of the Giant's Causeway. In this great mass we recognize the results of volcanic operations at a

period when the lava must have been very fluid, and consequently the angle of slope, as also the elevation of the mountain, could not become very great. The period of activity in this case must have been comparatively short, probably owing to the climatic influences which may have made it impossible for a volcano representing the southern Pacific type with its long, flat slopes of from  $5^{\circ}$  to  $15^{\circ}$  to exist for any great length of time. In many respects the lower slopes resemble those of Mauna Loa, with the exception of those around the immediate crater. Just at the last of this period of activity, the eruptions, still consisting of the denser lavas, must have been of a more violent nature, and thus a higher rim was formed than is usual in such mountains. This rim is almost a perfect oval, with very steep internal slopes of about  $60^{\circ}$ , which run down perhaps 1,500 feet to the bottom of a large basin having a longitudinal diameter of about three miles and a transverse diameter of about two miles; the diameter of the outer upper edge being, of course, much larger. The floor of this large area, covering several hundred acres, clothed with a dense forest, is nearly a perfect level except in the centre, where a slight elevation, also covered with trees, reveals the results of the last struggling efforts of the giant forces which were at work in the formation of this curious district. Standing on the edge of this once busy arena, and reading the plainly written history of its structure, which was thus burned into the surface of the earth by the now slumbering powers of the past, the scene is one of surpassing beauty. This garden lying so far below one's feet and its plain covered with magnificent trees, dotted here and there with meadows and quiet lakes, which lie so peacefully in the

gentler slopes of the surface of the basin, all tend to make one believe that the old stories of enchantment were not mere myths after all, and that perhaps the strange story of Sinbad might be at least founded on facts, or that the story-teller of the Thousand and One Nights was the lucky Jules Verne of ancient times. The view of the harbor of Sitka with its numerous islands, the snow-covered crests of the mountains, to the eastward, beyond Silver Bay, and the boundless Pacific stretching out to the west are to be numbered among those impressions that nature sometimes makes upon memory's tablets, which cannot be easily forgotten.

Turning from the edge of this wonderland to the south, the steep slopes of Edgecombe lie directly before us, and here we find evidences of a different form of the struggle for existence on the part of the nearly extinct volcano. The pent-up forces which had probably lain quiet for some time succeeded in forcing an opening. This period of activity brought to the surface the lighter scoriaceous material and piled it up around the new vent, thus forming a high, steep cone, which heretofore has been the most attractive object on the island. The slopes of the sides are generally from  $50^{\circ}$  to  $60^{\circ}$ , though in some places they are less. The steepness of these slopes, as compared with the larger mountain, being due to the fact that the forces were then violently eruptive, and the material was thus heaped up in strange contrast with the more even forms of the passive eruptions which must have taken place from the other crater, and which would resemble the comparatively quiet overflow of a boiling spring as contrasted with the explosions of a geyser.

This volcano has a nearly perfect crater, which is not



very deep. The bottom of its basin can be easily reached through a break on the southeastern side. Lava flows have also occurred from this peak, as their course can be traced down its sides, and they passed over the greater lava beds produced by the older mountain.

This mountain has been extinct for about one hundred years, and its active period must have been short, otherwise it would have partially obliterated the lines of the rim of the older crater, being situated so close to it. We have reports of its having been seen in eruption by the navigators who first came in sight of it, but considerable doubt is thrown upon their accounts from the fact that other mountains described by them as being in eruption have turned out not to be volcanic at all,—the clouds resting upon their summits having been mistaken for smoke.

The climb is not a difficult one, though it is very steep in places; it can be accomplished in one day from a camp on the inner shore of the island. It will fully repay the efforts which any one will have to make to reach the summit, for the world-renowned view of the Bay of Naples, as seen from proud Vesuvius, is not more beautiful.

Leaving Sitka behind us, the party departed for our field of operations on the U. S. S. *Pinta*, kindly placed at our disposal by Secretary Whitney, and many courtesies were shown us by the officers of the little craft. The day after our departure was passed on the broad Pacific, in full sight of Mt. Fairweather. Here, for the first time, we received a foretaste of the glories of this truly Alpine region, and the next morning the sight was completed by a clear view of Mt. St. Elias from the Yakutat village,

and when we had seen the two grand ends of this great range, almost the whole series being snow-capped mountains, we were satisfied that we had seen a region that eclipsed any thing that we had ever gazed upon in Switzerland or elsewhere, both in extent and beauty.

After obtaining some Indians to act as porters, we were taken to Icy Bay, and landed through the surf, when our active work began. The *Pinta* left a whale-boat with us at this point, and in it we made our way back to Yakutat, after the return from the attempt to ascend the mountain. The remainder of this paper will be devoted to a description of the various physical features of the Mt. St. Elias group.

The western slope of this system of mountains, including many of the highest snow-clad peaks of North America, may be considered an enormous glacial basin with a mountain chain around it, forming a great curve whose convex portion lies toward the northeast. This chain of mountains reaches a climax in Mt. St. Elias and a series of other lofty peaks, many of which are as yet unnamed, and not even located on the map. Starting from the headwaters of Yakutat Bay, where the average height of the mountains cannot be above 7,000 feet, they gradually increase in elevation until the giants of the snow-capped range are reached in a distance of about 40 to 50 miles ; Mt. St. Elias itself standing somewhat in advance of the rest of the range. This is a feature which is presented by many of the prominent peaks of the globe, viz. : that they do not stand directly in the main line of the upheaval but just out of the line and somewhat isolated, although there may be connecting ridges and shoulders reaching to them. After this highest

point is reached about the central portion of the curve, the elevations gradually decrease again, approaching the ocean to within a short distance, after having curved inland to a point about 20 miles from the coast. At about the centre of curvature of this basin we found a chain of sandstone hills, about 3,500 feet in elevation, which seems to be directly united with the southwestern face of Mt. St. Elias, by a low connecting shoulder. These hills we named after Prof. Paul Chaix, President of the Geneva Geographical Society. The strata of these hills have a most peculiar shade of purple color, and as the strata have different degrees of hardness, the active erosive powers of the frost and rain have given them shapes not unlike the upland prairie districts of some parts of Wyoming. The inclination of these strata is very slight, being scarcely over  $10^{\circ}$  in any portion of the whole mass which is continuous, and they can be traced from one end of it to the other, a distance of about 12 miles. This remnant, which is thus curiously placed, is undoubtedly all that is left of the old sandstone strata, which must have formed the shore of this region at some time in the past, having evidently been deposited after the great uplift of the metamorphic rocks which make up these magnificent mountain crests, and then were tilted to their present angle. This singular little range, composed of sandstone and thus peculiarly marked, is the only instance of either this formation or inclination of strata in the basin. It seems, strictly speaking, a reminder of a former state of things, for the glaciers which surround the whole of this range are covered for miles, often to a depth of several feet, with remnants of a similar nature, which must have been torn from the sides of this central

structure which divides the basin into two portions. Formerly it must have had a much greater extent parallel with the main range, but it has suffered more than any other part of the basin because of its position, which is directly across the path of the greater number and more massive glaciers that take their rise directly to the east and north. From the angles formed by this ridge and its connecting shoulder with the main range through Mt. St. Elias, proceed a large number of glaciers, moving in opposite directions, one group moving to the south, and the other toward the west. Each of these sets meets and joins the great groups of glaciers coming from the concave curves of the main range, which extend respectively from this central point to the southeast and northwest. The combined masses of ice from these many sources proceed in general at right angles to the mountain ranges at first, and then they sweep around toward one another, encircling the short sandstone range referred to above, in magnificent curves, sometimes giving a very broken appearance to the surface of the ice. This latter change in the direction of their motion being probably due to the fact that the largest number of tributary glaciers enter the main mass of these two great bodies of ice from the main range both above and below the centre of each curve respectively, thus determining the direction in which they move. The southern basin appears the larger of the two, and the ice mass which occupies it also covers the greater portion of the ground open to both masses, thus showing it to be the more aggressive and probably the more rapid in motion as well as the larger of the two. It passes along nearly to the western end of the Chaix Hills before meeting the glacier from the

other basin, although its component parts have had much farther to travel. That it should be more rapid in its motion could be explained from its southern and western exposure to the sun, and the climatic effects produced by the great warm current of the Northern Pacific, the Kuro-Siwo or Japanese current, either of which causes would easily produce an acceleration of its motion. That it is more aggressive can be easily seen from what has gone before, and from the effect produced upon the great northern body of ice. They meet in a distinctly marked line, which can be easily traced in the débris of the two sets of medio-terminal moraines which join at this point. That there is a struggle going on between these two giant masses is readily seen in the confusion of the moraines at the central portion and outer or oceanic extremity of the line of juncture, where the moraines are forced up much higher than at the inner extremity of the same line. At the extreme outer end of the line, of course, the roughness disappears somewhat, which state of things is due to the gradual recession of the ice laterally at this point in the southern portion, and the further fact that the main work has already been done (the other mass accepting the inevitable course forced upon it), causing it to move to the westward.

This westward course produces the bold northern side of Icy Bay, reaching its greatest seaward extent in Icy Cape, from which point the glacier gradually recedes to the northward. Icy Cape is thus a variable quantity, and may in some severe years extend a considerable distance out to sea, thus making quite a roadstead of Icy Bay, which character entirely disappears in other years when the ice mass recedes, and the bay then becomes a

mere curve in the shore. At the time we saw it, there was scarcely any thing which could be properly called a bay, and one would with equal justice dignify all of the great curves on our sandy eastern coast by the name, for to call it a bay would be very misleading.

Between the Chaix Hills and the great glaciers which surround them, we found two glacial rivers, whose waters form Castani Lake, named after the President of the Geographical Society of Rome, and this lake is situated near the western end of the Hills. These rivers vary considerably in the amount of water which sweeps along between the rocks on the one side and the ice on the other ; both of these walls are very precipitous, the ice wall being generally 200 feet in height, and often over 400 feet. Both streams are very inaccessible from the ice, and where the edge of the water could be reached, which was only once in several miles, they proved impassable on account of the volume of the water under even the best of conditions. The highwater marks on the sides of the Chaix Hills, however, showed the possibilities of these streams. For a distance of fully seventy-five feet above the regular level of the stream, every thing in the shape of trees, brush, or grass had been swept off in the most thorough manner.

These streams, like all glacial streams, are caused partly by the melting ice and partly by pressure forcing the water from the ice, and they empty into the lake already mentioned. Lake Castani has a somewhat triangular shape, two of its borders being high icy walls, and the third being the Chaix Hills. It covers several hundred acres, and its surface is dotted with icebergs, which are being continually formed in it from the glaciers

or rushed along down the two rivers mentioned above. These icebergs float when the water is high enough, but are stranded when the water is drained off. This peculiar body of water is situated directly opposite the line in which the two great glacial masses from the south and west meet one another, and the outlet of the lake, which was named Jones River in honor of the patron of the expedition, is a sub-glacial stream flowing under this line of contact, as near as we could judge, for the roaring current could be distinctly heard thundering along beneath our feet whenever we crossed this line. The stream rushes from between the two great glaciers at the seaward extremity of this line of juncture at a rate of upwards of ten miles an hour, and finally spreads over a large area, forming a long, narrow delta, covered for the most part with stones, sand, and mud, but with here and there a wooded island. The delta is cut in every direction by torrents, varying from less than a foot in most instances, to four or five feet in depth. Of course these swift streams change their position easily, thus precluding the possibility of producing a map which would be accurate for more than a short time. The upper portion of Jones River is liable to obstruction, and the water held back until it has accumulated strength enough to force its way along ; or the barrier may give way from other causes, particularly if it consists of ice, and then the increased volume of the stream obliterates most of the old channels and forms new ones, which in their turn meet with the same fate. After crossing this desolate waste for a distance of about eight miles, the various branches of the river reach the head of what is at present called Icy Bay, but what may become a series of prom-

ontories before many years if the present active deposit continues, for this indenture of the coast would almost be a straight line were it not for the extension of the great northwestern glacier out into the ocean, thus forming one side of this so-called bay.

So much for the general physical characters of this great basin to the south and west of Mt. St. Elias, the details of which we will present more minutely.

Near the eastern end of the Chaix Hills the longer of the two rivers forming Lake Castani rises from the side of the glacier from beneath a great ice arch, and passing down a very rapid slope enters a deep re-entering amphitheatre in the southern face of the ridge, forming a most lovely lake, from which the river again takes its onward course. The view of this lake, with Mt. St. Elias looming up beyond the guardian crests of the Chaix Hills, which watch over its peaceful bosom, as seen from the barren moraines after a hard walk, was most refreshing. The steep, deeply-wooded slopes surrounding this Crater lake, with here and there streams of water rising from the snow-banks on the upper portion of the Chaix Hills, and shot over the precipitous sides to break up in mist before reaching the bottom, or disappear amongst the foliage, all lighted up with the gentle rays of the setting sun, were a never-to-be-forgotten sight.

Some distance beyond this point, out on the ice several miles, and on the summit of one of the numerous ridges of débris forming the median moraines, at an elevation of 2,000 feet above the sea, a most extensive view could be had in three directions: over the great glacier to the southward between this position and the Pacific; then towards the southeast, over the immense field of ice

stretching off towards Yakutat Bay for a distance of forty miles; and then turning to the left once more, a full view was obtained of the long, gentle slope of the glaciers leading directly to the giants of the main range. Several of the peculiar physical features noticed from this point will be referred to later on. These slopes of the glacier one would naturally expect to be gentle, particularly with the existing exposure to the south, and the motion of this ice mass is undoubtedly freer than that of its companion with the western and northwestern exposure, whose motion would be probably more sluggish, and, as a consequence, produce less effect upon its bed, leaving it rougher, and the ice, particularly in its upper portions, more broken, and hence the tendency to form ice-cascades would also be greater. The slopes of the outcropping edges seem to be gentler on the southern side than on the western side of the mountain.

The main mass of Mt. St. Elias, which can be reached by either of these adamantine roads of ice, rises in majestic whiteness above the broad fields of desolation which are covered with shreds torn from its slopes by the icy clutches of the glaciers. The mountain itself has the form of a truncated pyramid as seen from almost any direction, but particularly from the shores of Icy Bay. From this point the steep slopes of this pyramid, though apparently not inaccessible, terminate in a long horizontal line, which forms the two shoulders of the mountain, one of which extends to the northwest and the other to the southeast. About the centre of this horizontal line, as viewed from the south, rises another pyramid of rocks, completely veiled in purest snow, which probably has a height of from 1,500 to 2,000 feet. This point forms the

highest part of this beautifully symmetrical mountain, whose total height probably does not exceed 16,000 feet, judging merely from comparison with other mountains. The heights usually assigned to it vary from 12,000 feet, as given by the older authorities, to 19,000 feet, as deduced from the trigonometrical work of our Coast Survey.

The mountain has often been referred to as an extinct volcano, and quite as often as an active one,—in fact, a sea captain reported this summer (1886) that he had seen smoke issuing from it; but there is no proof of the existence of a volcano anywhere in this particular group of mountains, in the components of the extensive moraines, which come together from all parts of the range, in the region crossed by our party, as none of the true eruptive rocks are present. In fact, the presence of the metamorphic rocks, sandstones, and slates, proves, if any thing, the reverse, and indicates that they are not of volcanic origin.

The occurrence of several almost perfect amphitheatres on the western face of the mountain will more than likely account for this delusion, as they resemble the craters of extinct volcanoes very closely, and could be mistaken for them at a distance. The moraines of glaciers which could be traced directly to these great amphitheatres were crossed, and no volcanic rocks found, thus showing that they must have had a glacial origin. This fact gives new support to the theory of the glacial origin of many other amphitheatres of the same general character in other mountain ranges. These occur notably in the Pyrenees, where many beautiful examples are found, which are called "cirques," and none of them are occupied by the snow and ice masses which undoubtedly caused them,

while here the glaciers are seen at their work carving them out of the sides of the mountains.

The whole region is very instructive as a geological study, and it is also interesting from a physical standpoint, as it gives us a clue to the formation of all the land lying between the foothills and the ocean. Most of the shores on both sides of Yakutat Bay are composed of a series of ridges of slight elevation, built up of glacial drift, left by the receding sides of the great ice mass which must have covered them at some time in the past. The ridges are heavily wooded in most instances, and this is especially true of the southern shores of the bays on this coast; on the northern shores, after a single ridge, in most cases, is passed, only the bare moraines are found; very often, however, these bare moraines touch the ocean directly, and in some instances the ice itself breaks through and forms the only shore line.

The southern shore of Icy Bay is wooded with spruce, and this belt of vegetation is very narrow, being confined to the ridges near the beach. These woods gradually disappear as the glacier is approached, and a low stunted growth of bushes, mostly of the laurel type, takes its place, and even these get to be sparsely scattered, and then die away entirely, leaving nothing but the bare stone heaps of the moraines. These masses of rock are so deep that they form a complete protection to the ice below them, and therefore it melts more slowly than the exposed portions of the ice in the upper portions of the glacier. This probably accounts for the long gentle incline of the lower portions of each of these glaciers.

When viewed from the point spoken of above, to the south of Crater Lake, the bands of exposed ice, represent-

ing the separate components of the main glaciers, become narrow very rapidly, and all of the long, white, ribbon-shaped points disappear beneath the accumulating masses of the median moraines, which are thus brought closely together, long before the end of the main glacier is reached. This fact explains the longitudinal and parallel arrangement of these moraines near the coast, and also the similar arrangement across the glacier where we passed over it. These moraines have a considerable height on the glacier proper, ranging from 50 to 350 feet, and where the ice has fully melted, of course these parallel accumulations of lines of débris occur as we find them on the coast. The presence of this series of ridges makes travelling across the glacier exceedingly difficult.

We have named the glacier occupying the main basin to the west, the Guyot Glacier, after Prof. Arnold Guyot, late Professor of Physical Geography in Princeton College; and that occupying the southern basin, the Agassiz Glacier, after the late Prof. Louis Agassiz of Harvard College. A portion of this latter glacier has already been named the Malespina Glacier, but as the name applies only to that part which lies along the northern shores of Yakutat Bay, and only accompanies the main mass as far as Point Manby, where it ends, it is believed that both names should hold good.

The impressiveness of the Mt. St. Elias group arises partly from the proportions of the mountain itself, which are very striking ; and partly from the fact that the group is situated so close to the water's edge that their full height can measurably be taken in at a glance, which is not the case where mountains rise from a plateau as they generally do. The view of this grand mountain obtained from

Icy Bay was one with which even the wildest mountain enthusiast would be fully satisfied.

Here the main portion of the extreme northwest belonging to the United States begins and the small strip which lies along the coast-line ends ; and though this spot is some 250 miles beyond the great archipelago tract, and is therefore beyond the reach of travellers generally, who may have to content themselves with only such occasional glimpses of this truly grand portion of the "Switzerland of America" as they may get by peeping between the clouds of Glacier Bay at the distant summit of Mt. Fairweather, it is nevertheless hoped that ours will not be the last trip to this glorious portion of our country.